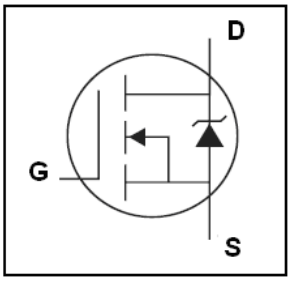
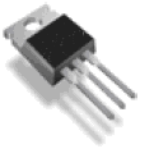
Features

- ♦ Extremely Low On-Resistance
- ♦ Fast Switching
- ♦ 100% Avalanche Tested
- ♦ Repetitive Avalanche Allowed up to Tjmax
- ♦ Lead-Free, RoHS Compliant



V_{DSS}	40V
$R_{DS(on)}$	2.2mΩ
I_D	230A



TO-220AB

VS40230AT

Description

VS40230AT designed by the trench processing techniques to achieve extremely low on-resistance. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating . These features combine to make this design an extremely efficient and reliable device for use in BLDC Motor、Brushed Motor drive applications and a wide variety of other applications.

Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only;and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_A) is 25°C, unless otherwise specified.

	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage		±20	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		40	V
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_D	Continuous Drain curren	T_C=25°C	230	A
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested (Sillicon Limit)	T_C=25°C	920	A
I_D	Continuous Drain current@V_{GS}=10V (See Fig2)	T_C=25°C	230	A
	Continuous Drain current@V_{GS}=10V	T_C=100°C	150	
	Continuous Drain current@V_{GS}=10V,(Package Bonding	T_C=25°C	120	
P_D	Maximum Power Dissipation	T_C=25°C	185	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.81	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		62	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed		960	mJ

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	40	--	--	V
$\triangle_{BR)DSS}/\triangle T_J$	Breakdown Voltage Temp. Coefficient	Ref 25°C, ID =1mA	--	0.032	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=40V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=40V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2.2	3.0	3.9	V
$R_{DS(ON)}$	Drain-Source On-State Resistance①	V_{GS}=10V, I_D=90A	--	2.2	2.6	mΩ
gfs	Forward Transconductance	V_{DS}= 25V, I_D=90A	--	100	--	S
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	--	5700	--	pF
C_{oss}	Output Capacitance		--	1450	--	pF
C_{rss}	Reverse Transfer Capacitance		--	540	--	pF
Q_g	Total Gate Charge	V_{DS}=20V,I_D=60A, V_{GS}=10V	--	120	--	nC
Q_{gs}	Gate-Source Charge		--	32	--	nC
Q_{gd}	Gate-Drain Charge		--	40	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=1A, R_G=6.8Ω, V_{GS}=10V R_L=30Ω,	--	16	--	nS
t_r	Turn-on Rise Time		--	58	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	70	--	nS
t_f	Turn-Off Fall Time		--	55	--	nS
Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)						
I_{SD}	Source-drain current(Body Diode) ①	T_C=25℃	--	--	230	A
V_{SD}	Forward on voltage	I_{SD}=60A,V_{GS}=0V	--	0.8	1.3	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=30A, V_{GS}=0V di/dt=100A/μs	--	26	--	nS
Q_{rr}	Reverse Recovery Charge			19		nC

NOTE:

①Pulse width ≤ 300μs; duty cycle≤ 2%.

② Limited by TJmax, starting TJ = 25°C, L = 0.24mH,RG = 25Ω, IAS = 90A, VGS =10V.

Part not recommended for use above this value

Typical Characteristics

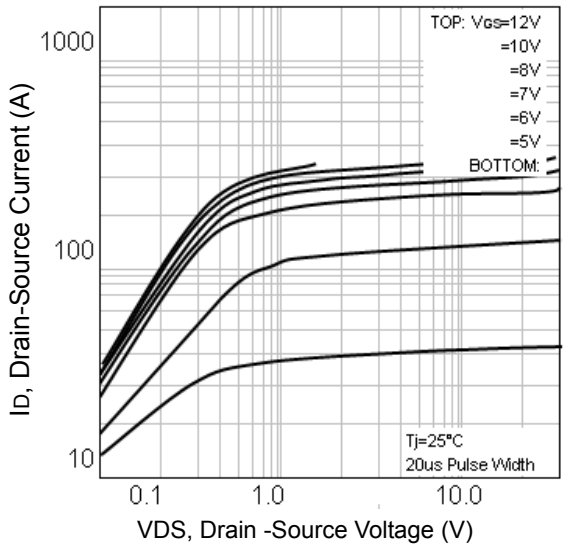


Fig1. Typical Output Characteristics

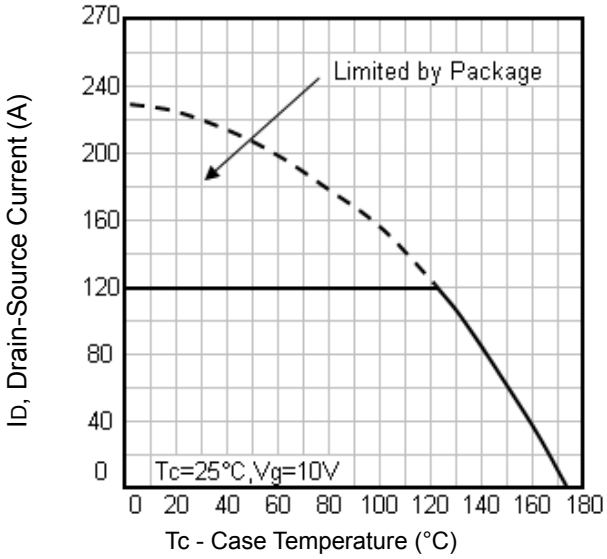


Fig2. Maximum Drain Current Vs.Case Temperature

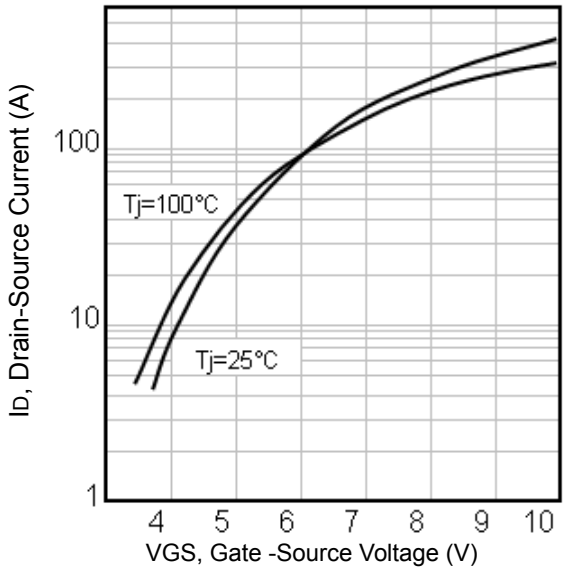


Fig3. Typical Transfer Characteristics

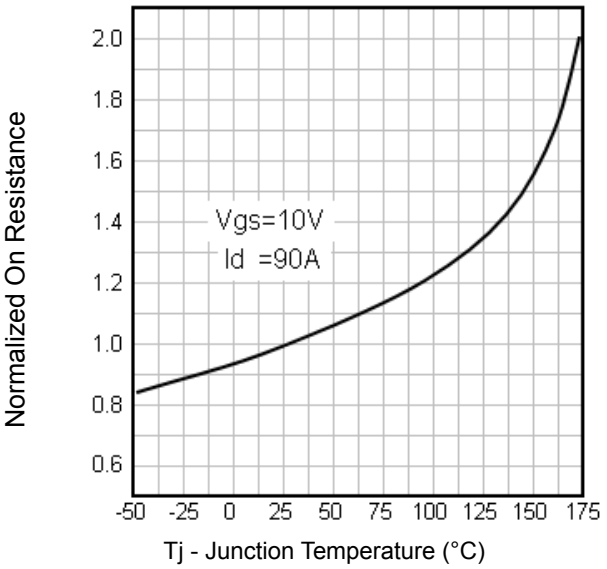


Fig4. Normalized On-Resistance Vs. Temperature

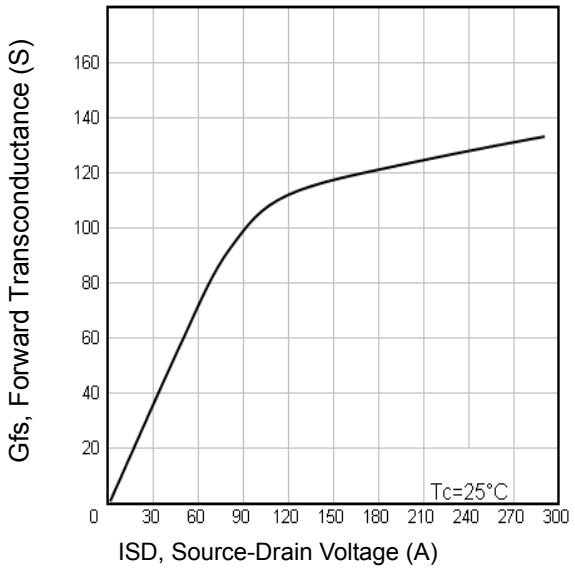


Fig5.Typical Forward Transconductance Vs. Drain Current

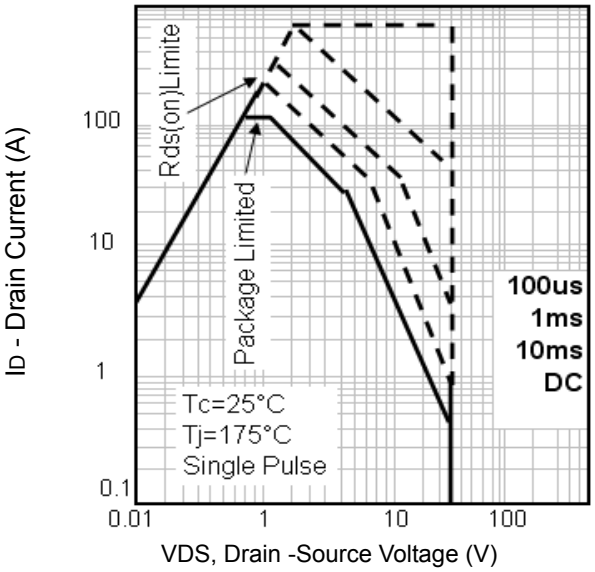


Fig6. Maximum Safe Operating Area

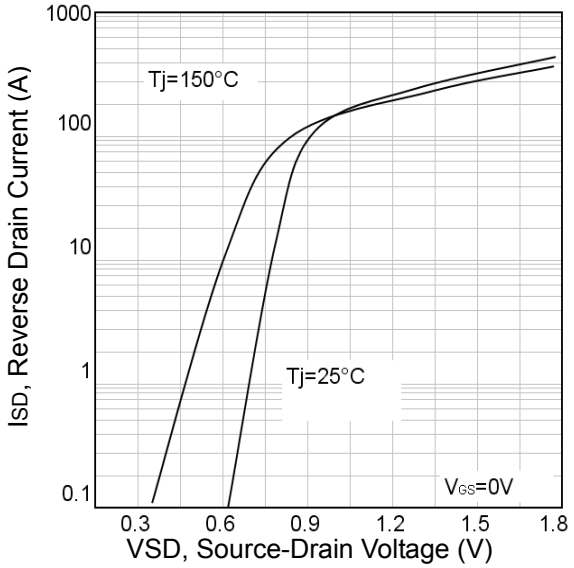


Fig7. Typical Source-Drain Diode Forward Voltage

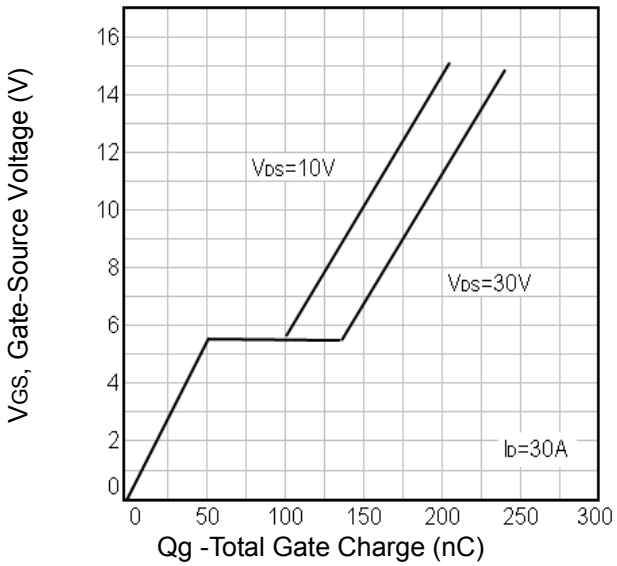


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

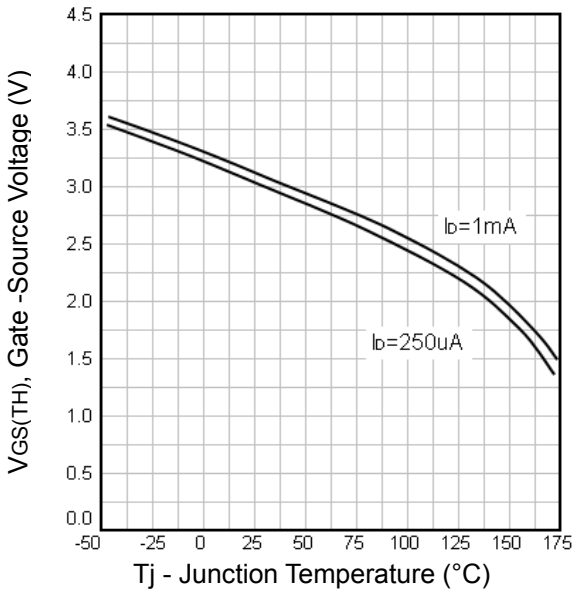


Fig9. Threshold Voltage Vs. Temperature

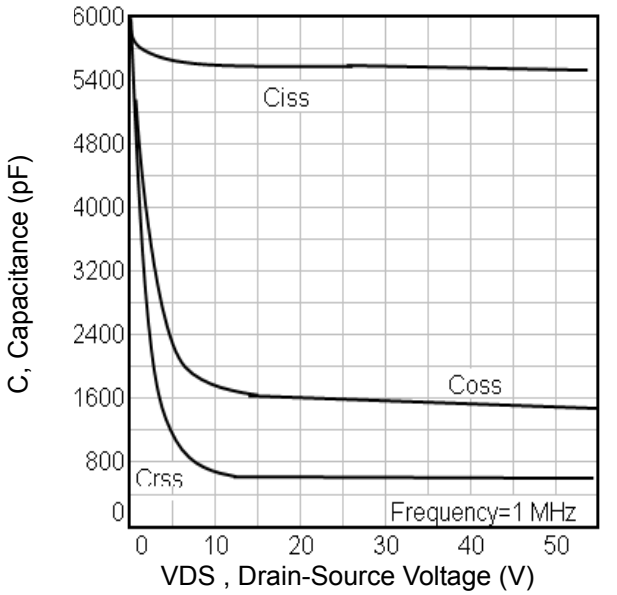


Fig10. Typical Capacitance Vs.Drain-Source Voltage

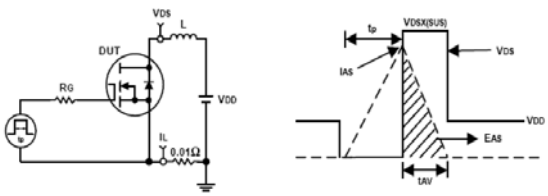


Fig11. Unclamped Inductive Test Circuit and waveforms

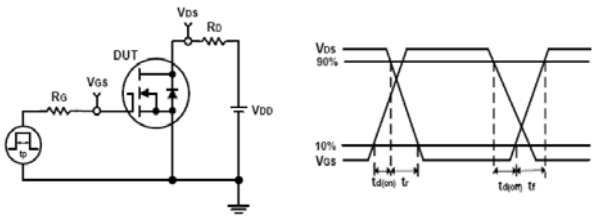
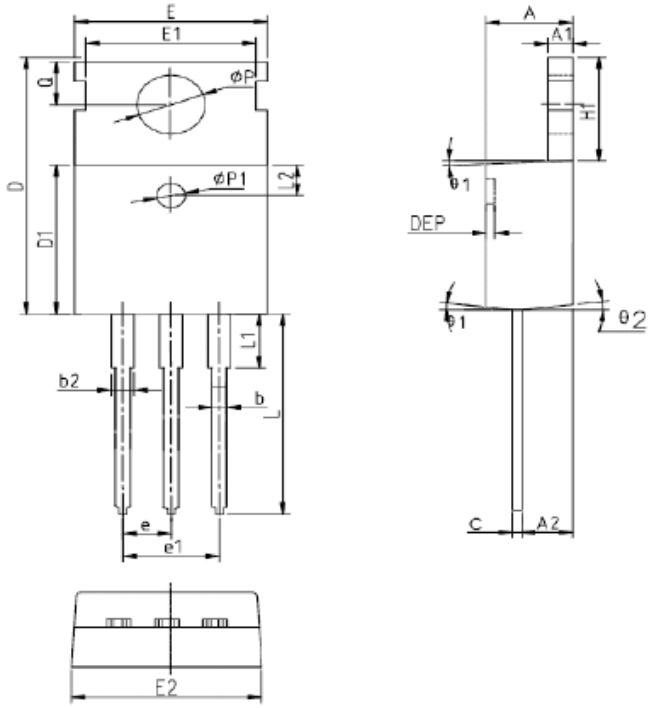


Fig12. Switching Time Test Circuit and waveforms

TO-220 Package Outline



SYMBOL	MM		
	MIN	NOM	MAX
A	4.40	4.57	4.70
A1	1.27	1.30	1.33
A2	2.35	2.40	2.50
b	0.77	-	0.90
b2	1.23	-	1.36
C	0.48	0.50	0.52
D	15.40	15.60	15.80
D1	9.00	9.10	9.20
DEP	0.05	0.10	0.20
E	9.70	9.90	10.10
E1	-	8.70	-
E2	9.80	10.00	10.20
Øp1	1.40	1.50	1.60
e	2.54BSC		
e1	5.08BSC		
H1	6.40	6.50	6.60
L	12.75	-	13.17
L1	-	-	3.95
L2	2.50REF.		
Øp	3.57	3.60	3.63
Q	2.73	2.80	2.87
θ1	5°	7°	9°
θ2	1°	3°	5°

Order Information

Product	Marking	Package	Packaging	Min Unit Quantity
VS40230AT	VS40230AT	TO-220	50PCS/Tube	1000PCS

Customer Service

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